

REMARKS

Further consideration of this application courteously is solicited. A Request for Continued Examination (RCE) is submitted herewith.

By this Response, the claims have been amended such that several dependent claims have been revised, or rewritten, to appear in independent form. Specifically, claim 10 now incorporates the subject matter of claim 9. Claim 24 has been converted into independent form by incorporation of the subject matter of original claim 15 therein. New claims 27-29 are based upon prior claims 10 and 14, 10 and 16, and 10 and 17 respectively. Prior independent claim 21 has been canceled. Allowed claims 11 and 18 remain unchanged. The dependency of claim 14 has been changed so that it depends now only from allowed claim 11.

This application now contains seven independent claims. However, no additional government fees are required. In this regard, referral back to Applicants' RCE filed on December 12, 2003 is made. At that time, appropriate payment for eight total independent claims was made.

This Response also makes corrections for typographical errors just recently discovered on page 19 of the specification. These changes properly include nozzles 81c which also are mentioned in the same paragraph being corrected, and clearly are shown in Fig. 11. No new matter is introduced by these corrections. Hence, entry of the corrections courteously is solicited.

With reference now to the Office Action of December 8, 2006, Applicants reply to the rejections based upon U. S. Patent 6,274,506 to Christenson et al. (hereinafter Christenson) and the additional rejection based upon Christenson et al. in view of U. S. 5,022,419 to Thompson et al. (hereinafter Thompson). Applicants still recognize and are appreciative of the Examiner's continued allowance of independent claims 11 and 18. The rejections based upon Christenson alone and Christenson in view of Thompson are traversed hereby.

Each of independent claims 10, 24, and 27-29 includes common features. These are that a substrate holder (1) rotates the substrates about the axis of the circular substrates themselves, and (2) the axis of the substrates is in the horizontal direction (horizontal); and that (3) the ejecting orifices of the nozzle eject “the processing liquid toward substantial centers of the substrates.”

To refresh memory of Applicants’ embodiment of summarized features (1), (2), and (3) above, brief reference again will be made to Applicants’ exemplary, preferred embodiment as shown in Figure 4. In Figure 4, the axis of the wafers, W, coincides with that of the rotating shaft 23a. Clearly, this axis is shown as horizontal, with it extending through the center of each of the wafers in their side-by-side vertical, arrangement. Ejecting orifices 53 spray processing liquid between the side-by-side wafers, to their centers. Shaft 23a thus rotates the wafers about their axis in accordance with feature (1) mentioned above. The axis through the wafers’ center and the rotating shaft 23a thus is horizontal in accordance with feature (2). And, the ejecting orifices 53 thus eject processing liquid directly toward the centers of the substrates, as held by the holder, in accordance with feature (3).

The December 8, 2006 Office Action asserted a “broadest reasonable interpretation” of the terminology in Applicants’ then pending claims. In applying such “broadest reasonable interpretation” the Examiner contended that most of the claims read directly on Christenson so as to support a rejection under 35 U.S.C. § 102(e). This rejection, and the other asserted rejections are overcome by the present amendment to the claims.

Beginning with claim 10, Applicants have added the requirement that the “ejecting orifices are formed so as to eject the processing liquid in a substantially fan-shaped pattern.” This is not taught or suggested by Christenson which only discloses side views of the liquid streams emerging from Christenson’s nozzles. There is no plan view similar to, for instance, Applicants’ Fig. 8A to suggest to those of ordinary skill in the art that Christenson’s nozzles eject the processing liquid in a fan-shaped pattern as opposed to a rectangular pattern, a funnel-shaped pattern, or any other such pattern. Hence, Applicants’ courteously submit that

Christenson does not teach or suggest claim 10 requiring each of features (1), (2), and (3) and the additional requirements of ejection in a fan-shaped pattern. For at least these reasons, claim 10 and its dependent claims 12, 13, and 15/10 are submitted as patentable over Christenson.

We move to claim 24. In addition to features (1), (2), and (3), claim 24 now requires that the ejecting orifices be “arranged in a space above a horizontal plane including central axes of the substrates to be processed, and also arranged in respective positions excluding an upper-projected space of the substrates.” Claim 24’s requirement for the ejecting orifices results in their placement such as shown in Applicants’ embodiment of Fig. 11 as described by Applicants’ specification at page 19, lines 1-19. Discharging nozzles 81a through 81c correspond to the nozzles recited in claim 24. When the nozzles are arranged such as shown by exemplary nozzles 81a through 81c, Applicants can prevent droplets of treatment liquid from adhering to the wafers W. Specifically, Applicants prevent the occurrence of liquid marks on the wafers W, which marks are caused by reattachment of droplets falling off of the nozzles onto the wafers during a drying process subsequent to ejection of the treatment liquids. In Fig. 11, the “upside area” referred to in the aforementioned paragraph on page 19 corresponds to the language in claim 24 “arranged in respective positions excluding an upper-projected space of the substrates.” The “upper” area corresponds to the recitation in claim 24 that “the ejecting orifices are arranged in a space above a horizontal plane including central axes of the substrates to be processed.” Christenson does not teach or suggest such placement for Applicants’ recited ejecting orifices together with Applicants’ recited structure referred to as features (1), (2), and (3) in the foregoing. Hence, Applicants likewise submit that claim 24 patentably distinguishes over Christenson. Withdrawal of this rejection to this claim, and its sole dependent claim 25, courteously is solicited.

Claims 27-29 are labeled as new, however, as indicated above, they are based upon previously pending claims. Each of claims 27 includes the subject matter of prior pending claim 10. To this subject matter, claim 27 requires that the nozzle also comprises a first nozzle, and a second nozzle. Claim 27 recites that the first and second nozzles are separated from each other

in a circumferential direction of the substrates with the first nozzle having a plurality of first ejecting orifices to eject a processing liquid to alternatively-positioned ones of the plural substrates, and the second nozzle having a plurality of second ejecting orifices to eject the processing liquid to other alternatively-positioned ones of the plural substrates. This recitation of the first and second nozzles in claim 27 originates from claim 14 in the application. Such structure, together with Applicants' structure (1), (2), and (3), is not taught or suggested by Christenson.

Applicants' first and second nozzles as recited from claim 27 are embodied in Applicants' exemplary, preferred structure shown in Fig. 10A, and schematically illustrated in Fig. 10B. Applicants regard this structure of two spaced apart discharge nozzles 54d as being an improvement over, for instance, their embodiment of Fig. 6A where the discharge nozzle 54a is shown as one block with 26 ejecting orifices. In the split embodiment of Fig. 10A, each discharge nozzle 54d has 13 orifices. Contrary to the Examiner's assertions concerning claim 14 in the December 8, 2006 Office Action, nothing in Christenson would have taught or suggested separation of a nozzle such as Applicants' nozzle 54a in Fig. 6A into two distinct discharge nozzle 54d such as shown in Applicants' Fig. 10A. Nothing in Christenson would have taught or suggested, to those of ordinary skill in the art, then arranging such split discharge nozzles along the circumferential direction of the wafers to position them at a particular angle of separation away from each other such as shown in Applicants' Fig. 10B. For at least these reasons, the prior rejection based upon Christenson alone properly cannot be applied to new claim 27.

Claim 28 adds the additional requirement that the processing container includes a lower portion which is formed to have an inner face with an inclination intersecting the horizontal direction at the angle more than five degrees. This additional requirement of claim 28 also reflects Applicants' preferred chamber 82 such as shown in Applicants' Fig. 11. Applicants discussed this aspect of the chamber of Fig. 11 at page 18, lines 29-37 of their specification. The chamber wall has an angle of inclination which the specification describes as preferably between

5° and 10°, and which claim 28 recites as more than 5°. Christenson does not teach this structure, along with overall features (1), (2), and (3), as required in claim 28.

Thompson does not remedy the deficiencies of Christenson to claim 28. In regard to claim 28, the Examiner has referred to the Summary of the Invention section of the Thompson patent and asserted that Thompson would have taught those of ordinary skill in the art providing a container with an inclined interface. His contention, however, respectively is urged as erroneous. In the section of Thompson that the Office Action points out, Thompson discusses mounting various components such as a rotor, a dry plate, a mounting plate, a removable bowl, and associated components at a predetermined angle to assist in drainage. Thompson's teachings of inclined mounting are not specific enough to teach or suggest Applicants' requirement in claim 28 for a particular structure of the processing container interface wall. Hence, claim 28 is submitted as allowable over both Christenson and Thompson, irrespective of whether these patents are considered individually or in combination.

Lastly, claim 29 adds the additional requirement to features (1), (2), and (3) that "the nozzle has an inside nozzle passage providing the ejecting orifices with the processing liquid, a sectional shape of the inside nozzle passage being rectangular." Christenson does not suggest any such details of the interior of the Christenson nozzles. For the most part, Christenson's nozzles are shown merely in schematic form. For at least this reason, Applicants likewise submit that claim 29 patentably distinguishes over Christenson.


In view of the foregoing amendment and remarks, it courteously is urged that all of the claims are allowable and that this application is now in condition for allowance. Favorable action in that regard earnestly is solicited.

If an extension of time under 37 C.F.R. § 1.136 is necessary that is not accounted for in the papers filed herewith, such an extension is requested. The extension fee should be charged to Deposit Account No. 02-4300; Order No. 033082 M 072.

Respectfully submitted,

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